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ABSTRACT

The problem of increasing academic motivation and performance in low-achieving students is conceived as an instance of cognitive control, the deliberate process of regulating one's own thinking. The study used experienced teachers to aid in adapting and testing classroom techniques for helping low-achieving students to become more self-regulated learners. Instruments were developed to measure student self-report of various cognitive learning strategies and interpretations (mental planning, attributions, self-efficacy, etc.). A 6-week application of the classroom techniques with low socioeconomic status black high-school students showed low overall use of cognitive learning strategies, large differences in cognitive self-report between classes, and complex pre- and post-changes alternately favoring the treatment and control groups. Results are clouded by differences in teacher implementation and similarities between strategies used by treatment and control teachers. (Author)

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Where There's a Way There's a Will:

Self-Regulating the Low-Achieving Student[1]

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ABSTRACT

The problem of increasing academic motivation and performance in low-achieving students is conceived as an instance of cognitive control, the deliberate process of regulating one's own thinking. The study used experienced teachers to aid in adapting and testing classroom techniques for helping low-achieving students to become more self-regulated learners. Instruments were developed to measure student self-report of various cognitive learning strategies and interpretations (mental planning, attributions, self-efficacy, etc.). A six-week application of the classroom techniques with low-SES black high school students showed low overall use of cognitive learning strategies, large differences in cognitive self-report between classes, and complex pre-post changes alternatively favoring the treatment and control groups. Results are clouded by differences in teacher implementation and similarities between strategies used by treatment and control teachers.

Studies have shown the problem of how to increase the academic motivation and performance of low achieving students to rank high among teachers' most pressing professional concerns (e.g., Cruickshank, Kennedy & Meyers, 1974). The present research conceives this problem from the psychological perspective of cognitive control, the process of regulating one's own thinking in the classroom (see also Meichenbaum & Asarnow, 1981). This conception defines the motivated student as one who deliberately analyzes and organizes academic information so that it may be retained and used. Our ideas refine the definition of "will" offered in 1890 by William James as "attention with effort."

Such cognitive activity may be observed through motivated behavior, as in "academic engaged time" (Berliner, 1979). But it may be examined more directly as well. The following is a quotation from Time magazine discussing the work style of current U.S. Budget Director, David Stockman. It illustrates the cognitive activity we have come to call self-regulated learning.

> When he was named Director of OMB, he read the entire 613-page federal budget line by line and table by table. A picture of related programs, money and goals formed in his mind. And from that guide came the proposed budget cuts that stunned Washington. He is a home-trained speed reader and may get up to 1,000 words a minute, but part of the swiftness comes from his mind's having traveled there before (Sidey, p. 23).

To accomplish his task, Stockman applied a familiar routine -- a cognitive schema that helped him sort out and structure complex information. This type

of schema is general (it applies to many similar tasks) and abstract (it is not tied to any concrete representation or image); and these properties facilitate reasoning about the task--its lack of specificity provides opportunities for personal instances to be applied (Abelson, 1976). The schema also depicts a mode of cognitive processing driven by specific higher-order or "metacognitive" components (Flavell, 1981). That is, rather than acting at an entirely "automatic" level, Stockman deliberately applied a familiar method for accomplishing this task; his learning was "self-regulated."

Self-Regulated Learning Defined

Theory and research in cognitive instructional psychology have led us to a process definition of self-regulated learning that comprises five component strategies. The strategies were refined and synthesized from theoretical models and research reviews targeting the cognitive processes involved in complex learning and problem-solving. Sources range from schema-elaboration theories of prose learning (e.g., Reder, 1980; Kintsch & van Dijk, 1978) to general process theories of attention and metacognition (Posner & Boies, 1977; Flavell, 1981) to theories of decision making in ill-structured or semi-structured problems (Simon, 1960; Keen & Scott Morton, 1978). We view the five strategies as sufficient for defining self-regulated learning (SRL) in complex tasks, but since some task situations may include instructional cues that accomplish one or more strategies for the learner, engaging in all five strategies is not always necessary for SRL to take place (Resnick & Glaser, 1976; Corno, 1981). Table 1 lists the five strategies along with brief descriptions and their relationship to the Stockman example.

Insert Table 1 About Here

Alertness and monitoring are "pure" metacognitive activities that bound and control the strategies of selectivity, accessing related schemata, and planning and use of specific performance routines. These last three strategies have both metacognitive and cognitive aspects, for they draw on other specific schemata relevant to the task situation. For example, planning processes are generic and metacognitive (Brown, 1978), but specific performance routines applied during that process derive from the cognitive (or lower level) store, and vary with the task situation. Events of instruction, such as organizing information in a particular way, or cueing the learner to content considered most important, may "short-circuit" or "model" the cognitive components of the schema (Salomon, 1979). The metacognitive components are, by definition, undertaken by the learner.

Theoretical Framework

Network Theory Context. The theoretical position we adopt views the process of self-regulated learning as ever increasing, deepening, and manipulating specific content networks or associative memory networks, including the strength of bonds between propositions. That is, self-regulated learning is an intentional effort to deepen and manipulate the associative network in a particular area (which is not necessarily limited to academic content), and to monitor and improve that deepening process. This view is consistent with general cognitive network theory (e.g., Anderson & Bower, 1973), and is being elaborated in a forthcoming paper (Corno, Note 1).

Psychological Effects. The self-regulated learner has a "way" to accomplish a range of academic tasks of which he or she is well aware. Such

self-knowledge should influence judgment processes in achievement situations. For example, it should raise the likelihood that a student will expect to succeed on classroom tasks. Bandura (1977) has operationalized success expectations as subjective probability estimates of successful performance on particular tasks, and labeled the psychological construct involved "self-efficacy." His research has shown self-efficacy to have a strong, positive influence on individuals' willingness to initiate difficult tasks, and on their persistence in the face of failure (Bandura, 1980).[2] These results apply to achievement tasks facing young students as well (Schunk, 1981; Collins, Note 2). Moreover, task initiation and persistence are common measures of motivated behavior (see Weiner, 1980), which are, by other names, "time on task," "effort," and "engaged time." Motivated behavior has been repeatedly linked to academic performance in studies of classroom teaching (Denham & Lieberman, 1980).

A second judgment process that should be influenced by self-regulated learning is the causal attribution. Much has been written about the importance of attribution processes in achievement situations. Weiner (1979), for example, has outlined a model of academic motivation that has attributions as key influences on motivated behavior (see also Covington & Beery, 1976). In general, attributions perceived as internal and stable (e.g., academic ability) have favorable effects on motivated behavior under conditions of success. When success is more ambiguous (as in the relative successes common in classroom instruction) or when there is clear evidence of failure, unstable attributions that are somehow controllable (e.g., effort, bad teaching) foster a second try. Under failure conditions, stable internal attributions can be serious

impediments to motivated behavior and, by influence, learning. For the student who is trying, the unstable internal attribution of effort should also have an unfavorable effect; here the positive judgment would be that the student took the wrong approach to the task (a "strategy" attribution). This possibility is generally not considered in attribution retraining studies which focus on effort attributions for failure (e.g., Dweck, 1975).

Self-regulated learners should be inclined toward more positive interpretations of failure -- particularly strategy attributions. Learning to systematically devise a strategic plan for completing academic tasks and experiencing the advantages such careful planning can bring should make planning and goal-setting knowledge cognitively salient during academic tasks. Salient knowledge is more readily accessed during the attribution process (Ross, 1977; Hogarth, 1981).

I have given a rather long-winded introduction to the present study. But this was necessary to place our effort in proper context. Our point of departure for the present study was to analyze and investigate self-regulated learning with respect to classroom teaching. This study was the first in an on-going program of research. Our challenge is to help teachers produce self-regulated learners in their classrooms, and our initial focus is students who have failed through the years to engage in self-regulated learning on their own -- students who have reached high school without developing this schema for complex learning, or have failed to discern strategic moves that might compensate. Our proposed method is to teach these students SRL strategies and support their use in the classroom. We aim to give students a "way" to approach complex classroom tasks (for "where there is a way, there is a will"), through the vehicle of knowledgeable, sensitive teachers.

Method

The study produced a program of teacher training and related student response instruments, and provided a short-term "trial run" of the program. The trial run assessed the implementation of training recommendations in a small sample of classes and provided a preliminary gauge of student response.

Sample

Participants were 12 teachers and their summer school classes in an inner-city high school in Oakland, California. Oakland had been identified as a district within reach of our research team, which was planning a remedial summer session for 9th to 11th grade students who had failed the State Minimal Proficiency Assessment in either of two subject areas -- reading and writing. Our intent was to obtain a reasonably homogeneous student pool -- students who had a history of poor performance in school, and who hailed from lower socioeconomic backgrounds. The final sample included 124 students, 98 percent of whom were black, with a modal age of 16. About 60 percent of these students were males. All students included in the sample spoke English as a first language.

The Oakland summer session lasted six weeks, with all classes held at one high school. Teachers were selected by the principal from a pool of some 50 applicants. The principal selected experienced remedial teachers, described by their supervisors as "excellent," and who taught within the Oakland system during the regular school year. We chose 12 teachers at random from this pool and invited them to participate in the study for an in-service compensation fee paid in part by their district and in part by the California

State Department of Education. All teachers consented. Of these 12 teachers, two were male; six were black, all but one had coursework or a completed degree beyond the bachelor's, and the mean years experience was 16.

It must be noted that these hand-selected teachers are likely to have been atypical representatives of the larger teacher population in Oakland. We did not intend to generalize from this sample but rather wished to try out the training program under circumstances as favorable as possible -- to maximize implementation in the short time provided.

Design

A simple design was preferred for this pilot study; our major focus was the training program and instrumentation. We ran a 2 x 2 factorial, with teachers assigned at random to either reading or writing classes and training or no training groups. Teachers who did not receive training were provided with materials after the study was completed. Since there were fewer reading than writing classes being offered, the design was imbalanced; however, we were able to maintain proportionality. Thus two reading teachers were trained and two were controls; four writing teachers were trained and four served as controls. Classes were small, with seven to 15 students per class, each meeting once a day for 90 minutes. Instructional objectives for each subject area were developed by the district and standard across classes.

Teacher Training

We conducted the training workshops in three, half-day sessions the week before school began. Teachers (a) learned and discussed specific theory

and research results regarding self-regulated learning and motivation and (b) were given concrete instructional strategies for use with low-achieving students. These strategies were demonstrated by trainers in short lessons in both subject areas. Teachers also designed a series of ten class lessons in their subject areas to teach, model, assess, and reinforce self-regulated learning. The lessons included class discussion plans and student seatwork designed to accomplish three major objectives:

1. To press students to use self-regulated learning to analyze and systematize their own methods for accomplishing classroom tasks. Task-focus helps to avert self-focus and other distractions (Mischel, 1974; Meichenbaum, 1978; Nicholls, 1979);
2. To permit students to experience some success on classroom tasks. Successes foster self-efficacy for related tasks, increasing the likelihood of still more successes (Bandura, 1980; Covington & Beery, 1976); and
3. To provide consistently explicit feedback concerning errors -- feedback which leads students to the source of the errors and, through partly internal, partly external attributions, directs a second try. Such feedback permits students to perceive and experience some control over their own performance (Cardelle & Corno, 1980; Dweck, 1975; Weiner, 1979).

Teachers traded and agreed to teach the ten lessons in their subject areas twice each week for five weeks. Teachers also designed posters to teach and display the five "Use Your Head Steps," which represented the five self-regulated learning strategies in language comprehensible to students (see Table 2). Table 2 also lists selected phrases consistent

Insert Table 2 about here

with the training recommendations teachers were asked to post on classroom walls and repeat to the class during the five-week term. Training sessions were audiotaped for later analysis.

Procedures

Trained teachers were each phoned twice during the summer to discuss implementation, but other implementation efforts (e.g., on-site coaching) were precluded by resource limitations. A 45-minute structured interview was conducted with each teacher (trained and control) during the final week of instruction to obtain implementation data from trained teachers and information on control teachers' methods (see Instrumentation). These interviews were conducted by research staff and audiotaped.

Data were obtained on student response variables before and after instruction. Questionnaires measuring self-report of self-regulated learning and related judgment processes were group-administered by trained research staff during the first and last weeks of the term, respectively. Items were read aloud to prevent error variance due to reading difficulty. Administration time for these measures was one hour. Teachers were asked to maintain absence records and to rate each student on effort towards schoolwork using a specially-designed rating scale (see Instrumentation). These two measures were considered indirect indices of student motivated behavior (direct measures such as classroom observations were beyond our resources). Student performance data included selected homework and seat-work samples (teachers submitted samples from students in their class) and

scores on the district reading or writing proficiency assessments administered by teachers at the end of the summer term.

Instrumentation

Student response measures are described followed by teacher measures.

Self-regulated learning. A 26-item rating scale obtained students' self-reported use of self-regulated learning strategies before and after summer instruction. This instrument was adapted from a metacognitive questionnaire developed by Peterson et al. (1981). Students used a five-point scale (anchored by "usually" and "almost never" with a category for "don't know") to indicate the extent to which they engaged in the cognitive activity that characterizes self-regulated learning during (a) class discussions and (b) individual assignments. A sample item representing selectivity, for example, was "Do you try to separate the main ideas of a lesson from the examples your teacher gives and remember the main ideas first?" A sample item representing monitoring was "When you work on assignments do you think about all the things you should have done and check to make sure you did them?" The scale contained items representing all five self-regulated learning strategies, as well as selected related cognitions (e.g., "When your teacher is giving a lesson do you repeat to yourself some of the things she says?"). Such related items were original with Peterson et al. and were included to assess relationships between the self-regulated learning items and other cognitions. Scores were 0 to 4 for each item, summed (where 4 was high). This scale obtained an alpha reliability of .70 at pretest and .80 at post-test, with students as the unit of analysis.

Self-efficacy. Self-efficacy was measured consistent with Bandura's (1977) specifications. A series of classroom performance tasks was the focus of the summer instruction in either reading or writing. These tasks ranged from relatively simple to more complex for each subject area, e.g., from correctly using telephone books to reading and analyzing statements of opinion in reading. For each subject area, these tasks constituted a 24-item instrument on which students judged (a) whether (1) or not (0) they could -- at that moment -- perform the task, and (b) how sure they were of their answer (a 5-point scale anchored by "not at all" and "positive"). The binary response was a measure of the "magnitude" of self-efficacy for reading or writing tasks -- how many of the tasks the student felt he or she could actually carry out. The score was a simple count. The scaled response was a measure of the "strength" of self-efficacy -- how confident the student was that he or she could in fact carry out the task -- and was, of course, indicated only for tasks marked "1" in the magnitude column. Scores were 0 to 4 for each item, summed (where 4 was high). The magnitude scale alpha coefficients were .86 (Pre) and .81 (Post), respectively; again with students as the unit of analysis. The strength scale alphas were .86 (Pre) and .92 (Post).

Performance attributions. The attribution instrument was designed to overcome some of the deficiencies of commonly used measures of student attributions. For example, attributions have been shown to vary along several "typical" dimensions -- locus of causality, stability, and controllability (Weiner, 1979). Yet most attribution instruments confound these dimensions (e.g., the Intellectual Achievement Responsibility Scale,

Crandall, Katkovsky & Crandall, 1965). Additionally, students are asked in these instruments to choose one among several specific possible performance attributions (ability, task difficulty, effort, etc.), rather than to make judgments with a more balanced view (as in a first and second choice). And finally, existing attribution instruments tend to confound attributions within the internal, controllable dimension. Attributions to effort are confounded with specific strategy attributions. As mentioned previously, the latter suggests a guided effort, while the former may be guided or blindly stabbing in the dark.

These measurement concerns resulted in an instrument of 18 items. Nine items presented common classroom situations in which the student was "successful"; nine presented situations in which the student experienced some degree of "failure." Students were asked to "Pretend this happened to you." Example items were "You didn't understand a math lesson," or "You wrote some good book reports." There were items included for reading, writing, and mathematics tasks to obtain generality over subject areas. Three items were written for each subject area, for each of the nine-item success and failure subscales. Students selected first- and second-choice attributions from six possible categories representing ability, effort, task difficulty, external help (or lack of it) from either the teacher or textbooks, strategy, and "other" (which required specification). The obtained variable of primary interest was a weighted composite of students' first and second choices (first choices were weighted by a factor of two) for the success and failure subscales. Subscale scores could be produced for the subject areas within success and failure as well, but these are based on three items and

generally evidenced low alpha reliabilities. The alphas computed for the nine-item weighted response subscales ranged from .29 to .60 with a mode of approximately .50.

District Proficiency Assessment. The Oakland district proficiency assessments are objectives-based tests in the basic skills areas of reading, writing, and mathematics. These tests were developed by the Oakland School District in conjunction with the Oakland Deaprtment of Research and Evaluation. They have been in use in the district since 1978, following passage of State minimal competency legislation. These tests contain both academic and literacy (e.g., reading a tax schedule) items. The tests are given once in the fourth through eighth grades, and twice in grades nine to twelve. The present research used the reading and writing tests, consisting of 30 and 39 multiple choice items, respectively. The writing test also had a writing sample subtest, which was scored wholistically by teachers. Total scores were converted to percent correct out of 100 for both tests, and subtests on writing were averaged.

District records were used to obtain scores for as many sample students as possible (a) on the tests they had taken prior to summer study in either reading or writing (only reading scores were obtained for reading students, and writing scores for writing students) and (b) on the same test when it was given by the sample teachers at the end of the summer session. Since district records were incomplete for some students, and since some students were absent the day of summer testing, the total sample for which both pre- and posttest proficiency data were available was only 73 percent of the original 124-student pool.

Teacher Rating Scale. The teacher rating scale was an adaptation of a scale developed by Crawford et al. (1978) to measure student "academic orientation" in the third grade. The present version was adapted for high school students with a history of poor academic performance. Teachers rated each student on a scale from one to four (with one being "more academically oriented"), according to the following criteria:

> The more academically-oriented student takes part and often answers questions correctly during question-and-answer sessions. He or she also actively seeks out the teacher for help with seat-work assignments. These students are interested in the subject matter being learned, will often persist at more difficult work, and get involved in classroom learning activities.

The description of the "less academically-oriented" student reflected a behavior pattern of the opposite order.

Teacher Interview. Structured interviews obtained information from all teachers on three factors: (a) biographical data such as years of teaching experience, education beyond the bachelor's degree, etc., (b) perceptions of summer class/students such as how the class compared with prior classes taught, and (c) what curriculum materials were used. Trained teachers were queried on general aspects of the training workships (what were the best and worst aspects, etc.) and on specific training content. In the latter category teachers were asked to describe steps they took to implement the instructional strategies recommended. For example, they were asked how the "Five Steps" were taught to the class, how students reacted, whether or not all ten of the specially-designed lessons were taught and why,

where in these lessons modifications of original plans were necessary, how feedback was provided, whether additional related activities (e.g., class motto; repeated phrases) were used and how. One set of questions asked teachers to detail their impressions of student responses to teacher strategies, ranging from reactions to the Five Steps, to ability to do schoolwork, to ability to internalize successes. And finally, trained teachers were asked about any self-evaluations they might have conducted during implementation, questions or concerns, and attitudes towards the recommendations.

Control teachers were asked to describe teaching activities they regularly used, which they felt were particularly effective for motivating students and helping them learn. They were also asked to identify how they learned these activities. Further, controls were asked to describe various aspects of their teaching style (e.g., how often they taught to entire class groups, used seatwork, asked questions, etc.), as well as possible use of techniques recommended in the SRL training (e.g., teaching students specific steps to go through in approaching a task, asking students to plan tasks themselves, providing guided feedback, etc.). This information was important for discerning differences and similarities between teachers that otherwise would not have been observed. And finally, controls were asked to describe reactions they felt students had to their teaching. The interview data were transcribed and collated across teachers to illuminate general response patterns, but were not quantified.

Results

Results of this study can be considered in four areas -- the effectiveness of the training workshop (from both teacher and trainer perspectives), the extent to which training recommendations were implemented in the sample classes, the utility and effectiveness of the student instruments, and effects of experimental variations on student outcomes. We discuss each area in turn.

Training Workshop

Trained teachers were generally responsive to the training workshop. The procedures used gave all six teachers an understanding of the intent of the training which they readily verbalized in the interviews. In addition, teachers felt particularly positive about the level of peer interaction during training, the organization of material, sharing class lessons, and the specific training content. A major concern for these teachers was the short amount of time spent in training and the brevity of the summer session. In general, the teachers felt they needed more time to ingest the theoretical ideas and related implications, as well as to develop and practice the self-regulated learning lessons. They also felt they needed an entire semester with their classes to get students really using self-regulated learning strategies, and to plan an organizational scheme that would teach, model, assess, and reinforce such use by students. The consensus was that lessons should be designed to teach each of the "Five Steps" separately, in addition to the lessons that covered concurrent use of the Five Steps.

All these points were noted by trainers as well. While the amount of time available for training appeared sufficient for giving teachers basic

principles and for suggesting ways of connecting new recommendations to each teacher's own instructional routines, time for practicing the restructured methods and for integrating them into the classroom was not sufficient. Trainers came away feeling some teachers (notably teachers 1 and 5) had a thorough integration scheme worked out, while others just barely grasped the overall ideas presented (e.g., teachers 3 and 4). In short, we expected individual differences in teacher implementation as a result of insufficient training time and attention. Future training efforts would include more time developing and practicing specific and general Five Step lessons, and classroom observations with feedback ("coaching," Joyce & Showers, 1980).

Treatment Implementation

Training recommendations were made specific to three aspects of classroom teaching -- instruction, monitoring, and feedback. In the area of instruction for self-regulated learning, teachers were asked to teach the Five Steps using a display poster and an inquiry method that built on students' own experiences. Sample posters and lessons were outlined and demonstrated in training. Teachers were also asked to determine a class motto and related "motivational" phrases (e.g., "Think 'til it hurts"), and repeat them regularly during the course of the summer session. Finally, teachers were asked to teach each of the ten specially-designed Five Step Lessons, which covered proficiency assessment objectives, but also modeled, assessed, and reinforced student use of the Five Steps. These lessons were accompanied by student worksheets that required use of the Five Steps on selected seatwork and homework assignments.

Interview data indicated that all trained teachers used posters to display and teach students the Five Steps. Other suggestions for teaching the Five Steps, such as capitalizing on students' own examples with an inquiry strategy, were used in varying degrees by these teachers. Additions and adaptations of the suggested procedures were common, but these were expected and encouraged. More than anything else it was stressed that teachers find "slots" for incorporating the recommendations into their regular classroom instruction, monitoring and feedback. All teachers also posted and referred repeatedly to class mottos; one example was "Striving, Cooperating, and Succeeding."

Both reading teachers said they used all ten of the specially-designed Five Step lessons and accompanying student worksheets. In contrast, one of the writing teachers taught all ten lessons as requested. One teacher (teacher 6) used eight of the ten lessons, while the other three made modifications or substituted their own lessons. These teachers felt the specially-designed lessons were either too long or cumbersome (e.g., students had trouble grasping the planning idea), and preferred to model and reinforce the Five Steps with a different approach. For example, one teacher (teacher 5) often went over the steps orally with students; teacher 6 had the students use the steps to write paragraphs, etc. When teachers did use the student worksheets designed for seatwork and homework, there was clear indication that students followed the Five Step procedure required, and began to use the steps on their own. This was an important result, as the worksheets were designed to gradually "phase out" prompts for using the Five Steps, in hopes that students would use the Steps spontaneously. Examination of selected student worksheets collected during the course of the summer

confirmed spontaneous student use of two of the five strategies -- planning and checking. It appeared that students naturally "reduced" the five steps to two -- a universal characteristic of human information processing.

In the areas of monitoring and feedback, training recommendations were for teachers to carefully monitor student seatwork by walking desk-to-desk and pinpointing the source of student errors. Once the source of the error was identified, teachers were asked to "direct a second try," make certain the student did not attribute the error to a lack of ability, and "always find something positive to say." Teachers were also asked to set up and enforce specific guidelines for students to use to "get help when stuck," and to give extra credit on assignments and tests for correcting errors.

Interview data showed trained teachers to vary considerably in implementing these recommendations. Setting guidelines for help and giving credit for corrected work were readily implemented by all but one teacher (teacher 4). The teachers had more difficulty providing the specific attribution feedback recommended and directing "second tries." Estimates teachers made of how often they used these techniques when given the opportunity ranged from 30 to 95 percent, with teachers 3 and 4 at the low and teachers 1 and 5 at the high end of this scale. Given that this area of training was perhaps the most difficult to convey clearly, and given that being able to "pinpoint the source" of an error depends heavily on the teachers' willingness to monitor students closely, between-teacher variability was not surprising here. Note that teachers who did and did not have trouble in this area were the teachers suspected as having less

and more of an "integrated" view of the training recommendations, respectively.

In sum, it appeared that trained teachers were generally supportive of the recommendations made and did implement selected recommendations as requested. Other recommendations were adapted to fit individual teacher preferences or not used because of time pressures. The teachers who integrated the most recommendations overall were teachers 1 and 5; those integrating least were 3 and 4. The aspects of training particularly de-emphasized in classes of teachers 3 and 4 were the instruction in self-regulated learning and the attribution-directional feedback. Aspects of training these teachers emphasized were breaking down complex tasks and positive feedback. Teacher 1 was in reading; teachers 3, 4 and 5 were in writing classes.

Interviews of control teachers provided important information on what techniques of instruction, monitoring and feedback they used. The impact of this information was to blur the distinction between treatment and control groups; for control teachers used several of the training recommendations on their own. All four of the writing controls used instructional techniques for breaking down the writing task (mapping, outlining, etc.). These teachers all stressed the writing process, rather than outcome, on their assignments and grading, and used topics with which students had some prior knowledge. Two of these teachers (teachers 11 and 12) regularly worked with students to "make writing plans," and systematically checked for the source of student errors in written work. The two reading teachers also said they moved from simple to complex tasks. All control teachers gave credit for corrected work, although few set guidelines for getting help.

In retrospect, this sample of teachers -- experienced as they were in remedial teaching methods -- may not have been the best group to try out a unified, research-based approach. The trained teachers saw several of the techniques as "things they already did." These they easily accepted and used as part of their regular routines -- breaking tasks apart, strong encouragement, etc. The techniques that were new (e.g., instruction in the Five Steps) were much more difficult and therefore less carefully integrated within the short time provided. The fact that control teachers also used the more familiar remedial methods, in turn made student outcome differences between treatment groups unlikely.

Student Instrumentation

Procedures. The student cognitive process battery was easily group-administered within the one-hour allotted time period. Administration time varied from 40 to 60 minutes at pretest and from 30 to 50 minutes at posttest. Demonstrations of acceptable responses proved necessary at pretest only, but administrators did monitor student responses to ascertain that markings were appropriate.

Reliability. Alpha reliability analyses computed for each measure indicated specific items which failed to discriminate among individuals or to correlate with total scores or subscales and, in the case of the attribution measure, categories that were never or rarely selected. These analyses are being used to revise the instruments for future use and reconstruct some scales for data analyses not yet completed. In particular, reconstructing the nine-item success and failure attribution scales by deleting a small number of items would enhance reliability estimates considerably. Similarly,

combining specific attributions over dimensions (e.g., effort and strategy are both internal and controllable) would increase alpha estimates over each category alone. Data for the attribution category designated "other" proved so scant as to render the category meaningless, so student reponses included in that category were reexamined and subsumed under one of the other five categories where a judgment could be made easily about where they might fit (e.g., many other responses were restatements of effort or strategy in the student's own words). Where an easy judgment could not be made the data were omitted.

Separate reliability analyses conducted for first and second choice attributions generally evidenced lower alpha coefficients than weighted responses. This result supported use of the weighted responses over either choice separately in further analyses. It also attested to the validity of the weighted judgment "view of the world" relative to a forced choice.

Validity. Alpha analyses were also used to examine relationships among the self-regulated learning and "other cognitive process" items on the self-regulated learning scale. Means were relatively uniform across items on this scale and item intercorrelations had a range of .53. Only one of the four "other cognitive process" items behaved somewhat differently from remaining items; with this item removed the reliability of the scale at pretest would be .72 (compared to .70); at posttest the reliability would remain .80.

Intercorrelations of the self-efficacy scales were high; the magnitude scale (SEM) correlated .81 with the strength scale (SES) at pretest and .70 at posttest (all r's used students as the unit of analysis). Correlation analyses are still being run on the various attribution scales, but using

weighted choice responses pre-post correlations appeared relatively high (e.g., strategy attributions correlated .55 for success and .27 for failure, a typical pattern).

Specific attributions expected to conform to important attributional dimensions in fact did so. Effort and strategy attributions are internal and controllable; for success the correlation between them was -.33 at pretest and -.41 at posttest. The pattern was similar for failure, suggesting that students who chose strategy attributions tended not to choose effort attributions and vice versa. There was some conceptual overlap between these two categories, yet students were able to distinguish one from the other. Similarly, the most extreme version of the internal-external dimension was given some validity as ability attributions for failure tended to correlate negatively and strongly with the two external categories, teacher/text and task difficulty (range = -.28 to -.37). This pattern was consistent pre-to-post, again suggesting that students who tended to blame themselves for failures avoided other, perhaps more constructive, attributions (the pre-post r for failure attributions to ability was .24).

Treatment Effects

Treatment effects are viewed descriptively since the study did not formulate hypotheses.

Correlations. Table 3 presents intercorrelations of all student measures

Insert Table 3 about here

except the 24 attribution scales. Pre-post correlations were generally high and positive, ranging from a low of .38 (pre-post reading) to a high of .65 (pre-post SRL). While some changes occurred during the six-week period, then,

these changes were small overall. Correlations among the self-efficacy measures were particularly high, as was expected by the design of the instrument; SEM and SES correlated .70 and .81 at pre- and posttest, respectively. SRL was related to self-efficacy at both pre- and posttest, particularly to strength of self-efficacy (r = .41 and .31, respectively). Scatterplots confirmed this relationship; students who reported engaging in more self-regulated learning tended also to have higher expectations for success. As will be seen shortly, however, it was not the case that student gain in SRL was associated with corresponding gain in SES; the pooled correlation of gain scores for both measures was .04.

Table 4 presents correlations among the attributions and other cognitive measures. There can be seen a pattern of consistent, moderately negative

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Insert Table 4 about here

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correlation among the three cognitive measures and failures attributed to effort. In this sample, students who scored high on self-regulated learning and self-efficacy tended not to attribute failures to a lack of effort; they did tend to attribute failures to not taking the correct approach to the task (strategy). There was a consistent pattern of positive correlation across the strategy measures, although the magnitude of correlation tended to decrease somewhat pre-to-post. Another optimistic result was that these same students attributed successes to ability more than any of the other attribution categories, particularly at posttest. Correlations among the three cognitive measures and external attributions can be seen in the table as generally negative but negligible. The pooled correlations of gain scores on these measures showed no consistent patterns.

Table 3 also shows the two measures of motivated behavior--absences and teacher ratings--as they interrelated and related to SRL, self-efficacy, and achievement. The correlation between the motivated behavior measures was positive (.18); however, unlike the teacher ratings, the absence tallies were unrelated to most of the other measures. The teacher ratings evidenced moderate, negative correlations with most of the cognitive measures (r's ranged from -.21 to .03). The only attribution scale to demonstrate a relationship with teacher ratings was the strategy scale, which showed a moderate negative relationship pre-to-post on both success and failure scales (r's ranged from -.29 to -.14 with stronger correlations on the failure scale). In sum, students rated as less academically oriented by their teachers, in general, said they used less self-regulated learning, had lower self-efficacy, and made fewer strategy attributions, particularly for failures.

The teacher rating measure correlated as expected with student achievement. These r's ranged from -.16 with the writing pretest to -.57 with the reading posttest. Also as expected, the cognitive measures correlated positively with student achievement, but at lower levels than did the more immediate motivated behavior measure. Gains in reading and writing correlated .10 and -.19, respectively, with teacher ratings; scatterplots showed a few outliers influencing the reading gain correlation such that without these extreme scores the relationship would have been moderately negative as well. Gains in SRL and self-efficacy showed moderate, positive relationships to student achievement gains.

Pre-Post Differences. Tables 5 and 6 present means and standard deviations for major student variables broken down by treatment and subject matter groups. Readers will recall there were maximum possible scores of

Insert Tables 5 and 6 about here

104 on SRL, 24 on SEM, and 96 on SES. The obtained means on SRL and SES were low relative to these maximums. Also there were sizable pretest differences across groups on these three measures, differences favoring the reading classes in each case and the treated group on self-efficacy. Thus, while the random assignment procedure used obtained group homogeneity on prior achievement, it did not control for initial group differences in SRL, strategies and expectations.

Table 5 also shows that what little changes occurred in SRL pre-to-post were losses -- in the writing classes of both treatment and control groups. Larger, generally positive changes occurred in self-efficacy pre-to-post, particularly in control group writing classes. All changes in achievement means were gains, with reading classes superior to writing and apparently negligible treatment group differences. There was some between-group variability on motivated behavior but these differences were not large.

The attribution means, shown in Table 6, indicate these students tended, on average, to make positive attributions for success. Ability was the most often selected category, while task ease was the least. For failures these students' attributions were more varied; ability, strategy, and task difficulty were all popular choices, although there were indications of pre-post change (described later). Apart from their tendency to attribute failures to a lack of ability, these students showed generally positive attribution patterns. There were no group-related attribution differences at pretest, except for teacher/text attributions to failure. Reading classes selected this category more often than did writing classes.

Figures 1 through 6 graph selected results. Figures 1 through 4 (for SRL and SES) also display pre-to-post data separately for each class. We

Insert Figures 1 through 6 about here

selected the strength of self-efficacy scale for illustration, but the magnitude data followed the same pattern. These figures are telling for at least three reasons. First, it can be seen immediately that there were large class differences at pretest on both cognitive measures; the treatment group's self-efficacy advantage and the advantages in reading classes are also evident. Second, the between-class differences persisted to posttest; the only evidence of consistent positive change from pre-to-posttest was on the SES measure in control classes. These differences in the direction of change were accompanied by clear magnitude differences as well. Some classes show large positive pre-post changes while others show large negative changes or no changes at all. For SRL, fewer treatment than control classes showed performance decrements. For SES, the treatment group figure shows three classes remained level or dropped slightly, while the control classes all gained. And third, the figures 3 and 4 make apparent the subject area differences on SES. Almost all writing classes show performance increments with generally greater increments in the control group.

Class 3 was a strange exception. This teacher managed a marked increase in self-efficacy and a corresponding decrease in SRL. Teacher 4 shows the same pattern, through less dramatically. Readers will recall earlier notes that teachers 3 and 4 were considered "least integrated" after training. Teachers 1 and 5 were considered most integrated. Teacher 5 incurred gains on both measures while 1 lost in SRL and leveled in SES. The only

other class to gain on both measures was 7 (a control). In general, the situation appeared somewhat more favorable for the treatment group on SRL, but only by fewer losses. The control group showed stronger average gains in SES, mostly in writing classes.

Finally, Figures 5 and 6 present group differences pre-to-post on the weighted choice attribution scales. Figure 5 shows an overall gain in successes attributed to ability. Success attributions to strategy, teacher and task all decreased during the six-week period. This figure also shows negligible mean differences between treated and control groups on all categories but ability attributions. Here the control group made somewhat larger gains in ability attributions to success than did the treatment group (effect size = .27).

Examining the failure attributions in Figure 6 we can see that gains were made in three of the five categories -- ability, effort, and strategy. There was a corresponding decrease in failures attributed to task difficulty. In general these students took personal responsibility for their own performance -- whether success or failure, and this tendency was stronger after the six-week summer session than before it. The figure also shows that two categories evidenced some group differences in the expected direction. Increases in ability attributions for failure were greater, on average, in the control group; the effect size coefficient was .21. And increases in strategy attributions for failure were greater, on average, in the treatment group (effect size = .16). Again, however, these differences appeared slight and masked in part by between-class differences in attribution patterns occurring at a somewhat lower magnitude than those presented for the SRL and self-efficacy measures.

There were differences across classes on the teacher ratings as well. The lowest mean was 1.25 (s.d. = .45), the highest 3.0 (s.d. = .58). Class gains in achievement ranged from .07 to .27 in reading (s.d. = .10) and .05 to .15 in writing (s.d. = .10). Classes with sizable achievement gains had corresponding gains in self-efficacy; the positive relationship between SRL and achievement gains was less consistent.

In summary, the treatment aspect of this study produced mixed results. Treatment group differences were clouded by differences between classes. Some attribution results were consistent with expectations while results for SRL and self-efficacy generally were not. Moreover, most of the cognitive process changes took place in the writing classes, while greater achievement changes occurred in reading. Achievement gains were consistently and positively related to gains in self-efficacy. Results for certain classes followed this pattern on SRL -- some of which were taught by teachers identified during training as having a clear grasp of the material.

Discussion

This initial research effort has informed us on several levels. Perhaps the most encompassing lesson -- and one not new to this field -- is the important influence classroom context plays in the implementation and effects of instructional change. As Bronfenbrenner (1977) has said, classroom learning does not "take place in a vacuum." Knowledge is co-constructed and learning is coordinated by students and teachers in relation to one another.

The teachers' task for the Oakland summer session was to increase students' reading and writing proficiencies. Techniques they were asked to

use for our study were seen as consistent with this objective but peripheral. In fact, it appears that much of what we recommended was actually inconsistent with the manner in which these experienced remedial teachers generally accomplish such objectives. Take, for example, the idea of establishing a general task orientation, including breaking complex tasks into simpler sub-tasks, and planning which steps to take first so students can experience successes on specific subject matter skills. The mental set that predominated among these teachers was that task analysis and planning would be performed for students by teachers; these students were not being asked -- for whatever reason -- to partake in the process. This "short-circuiting" of students' own processes would be expected to accomplish the skill objective, but students would not necessarily observe the process nor receive guided practice on how to carry out such activities on their own. The importance of the last two methods was the intended message of training; these teachers argued such an approach was infeasible within the short time period available.

Interestingly, the short-circuit approach to task analysis and planning was also readily used by control teachers, which leads us to conclude that these methods are common to "good remedial teaching" in general. In this area of training, anyway, our treatment teachers seemed to make only compromise attempts to alter what they would have done ordinarily.

These compromises may be one explanation for the notably larger gains in self-efficacy made by control classes. Also, analyses of SRL item data showed what gains occurred were on task analysis and planning items primarily. Gains on these items were responsible for the slight SRL advantage observed in treatment classes. Thus, while treatment teachers may have made small strides in SRL by trying to spur student self-planning, this more

"difficult" work may have hindered students' self-efficacy relative to that of control students, who experienced successes without as much individual effort. This explanation does not account for the greater increase among control classes in ability attributions for success; one would expect greater increases among treated classes. But Bandura's (1980) theory argues for reciprocal relationships among self-efficacy and achievement attributions, which would make it possible for increases in self-efficacy alone to account for increases in ability attributions to success. The emphases treatment teachers placed on analysis and planning may also explain treatment group increases in failure attributions to strategy relative to ability, and corresponding decreases in attributions to external sources.

It does seem clear that treatment teachers were unable to effectively handle all components of the total training effort within the time period provided. Perhaps their working hard on guided practice with task analysis and planning detracted from similar efforts to reinforce certain attributions and focus on other SRL strategies seen as more peripheral to the primary skill objectives. The fact that treatment teachers proved inconsistent in their teaching (not to mention modeling and reinforcement) of selectivity and monitoring, may account for the observed decrements on SRL items measuring these strategies. The teaching of selectivity, monitoring, and accessing schemata in particular seems to require techniques inconsistent or even counter to methods that might readily increase basic skills use. Strategy use entails demonstration and guided practice with reinforcement, while skill acquisition entails analysis, organization and relatively rote practice (cf. e.g., Gagné & Briggs, 1979).

We found our teachers did rather consistently provide credit for correcting errors in work. But again, while this was one among several recommendations made for encouraging self-checking, it was the only one consistent with these remedial teachers' typical classroom techniques. The other recommendations required modifications to habitual teaching routines, e.g., the phased-out worksheet prompts, making students self-check in group and whole-class lessons; repeating "self-checking" slogans over and over, all of which were less often used. In an effort to do some of what we asked, our treatment teachers did what they felt most comfortable with.

Despite what seem to be some sensible explanations for the mixture of results that occurred in these data, we can't escape the fact that there were large idiosyncratic differences in these teachers' responses to training. Only one trained teacher (teacher 5) managed to make increases in all variables during the summer time period. This was a highly energetic black woman with a clear command of her subject area, many years experience with remedial students in the district, and "all but dissertation" in education. In contrast, there was another black female (teacher 3), with less experience, far less energy, and no graduate training. She used standard remedial methods to make large gains in self-efficacy; yet found teaching the Five Steps and related things we asked of her too difficult. This doesn't explain the large loss her class showed in SRL, but it does raise questions about incompatibilities between routine short-circuiting methods and SRL training in general. And finally, a third black female is teacher 6. She had a class that remained level on SRL, SES, and achievement, yet showed greater decrements in ability attributions to failures than any teacher in the sample. Again, this teacher had a very different temperament, background, and approach; she chose to

emphasize the encouragement aspect of the training recommendations, and to focus on reattribution remarks to students. She was a former actress who radiated poise and personal flair.

What do these results imply for future research efforts? Training modifications mentioned include providing more time for both training and implementation, incorporating on-site coaching, and emphasizing the component interface among SRL, SES, and attribution teaching techniques, and how these differ from skills instruction. The results also imply an experimental methodology that considers change separately across individual teachers, e.g., where the same teacher has two classes, one treated and one control. Meta-analysis can be used to combine results over teachers. In addition, the coaching and evaluation systems used should be sensitive to idiosyncracies among teachers and how they might differentially influence student responses. Coaching observations, for example, could focus glaring technical differences between teachers toward a more common end within which personality differences could have freer reign. At least then differences among teachers that do occur can be traced to personality factors and not differences in treatment delivery per se. The next phase of our research details such an approach (Corno, Note 3).

The present study resulted in some support for the theoretical connections espoused. The fact that measures of self-regulated learning appeared positively related to self-efficacy, strategy attributions, and teacher ratings of motivated behavior supports major linkages in the SRL model. Similarly, the consistent positive relationship between gains in both self-efficacy and student achievement and teacher ratings and student achievement extends the

evidence supporting self-efficacy theory and previous research on teaching, respectively (Bandura, 1977; Denham & Lieberman, 1980).

Finally, I should note that this study depicts a sample of low achieving, low SES black students exhibiting clear tendencies to attribute school outcomes to themselves. This may be due to an invidious history of blame (e.g., Banks, McQuater & Hubbard, 1978). But whatever the cause, the study also showed this tendency could be used to advantage; for students were able to see their way to make self-attributions that were controllable, and initially low expectations for success yielded readily to teacher intervention. Indeed, some anecdotal evidence supporting spontaneous use of planning strategies on homework and seatwork assignments suggests that self-regulating the low achieving student may not be outside our reach.

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Table 1

Five Strategies of Self-Regulated Learning
and David Stockman's Learning

Strategy	Stockman Example
Deliberate Alertness	Reading budget line-by-line
Selectivity	Picture formed in mind of money and goals
Accessing Schemata	
Planning	Guide of proposed budget cuts
Monitoring	No mention, but a safe bet this took place

Table 2

Five Student "Use Your Head Steps"
and Suggested Classroom Slogans

Use Your Head Steps

1. Figure out what you are to do
2. Decide what is most important first
3. Use what you already know
4. Make a plan
5. Check and encourage yourself

Suggested Slogans

- Think 'til it hurts
- Make a plan, Stan
- Ask silent questions
- Know when you don't know
- Picture the problem solved
- Break the task apart
- Success often starts with mistakes
- Computer

Table 3

INTERCORRELATIONS OF ALL STUDENT MEASURES EXCEPT ATTRIBUTIONS
(N = 124 Students)[a]

		1	2	3	4	5	6	7 (N=75)[b]	8 (N=79)	9 (N=26)	10 (N=24)	11	12
1.	SRL PRE		.65	.25	.10	.41	.26	.25	.10	.35	.19	-.20	-.20
2.	SRL POST			.26	.10	.43	.31	.16	.15	-.16	.20	-.19	-.16
3.	SEM PRE				.40	.81	.45	.13	.13	.06	.45	-.03	-.14
4.	SEM POST					.32	.70	.05	.19	.12	.37	.00	.03
5.	SES PRE						.50	.28	.24	-.02	.44	-.05	-.21
6.	SES POST							.15	.20	.51	.45	-.04	-.12
7.	WRIT PRE (N=75)								.51	--	--	.00	-.16
8.	WRIT POST (N=79)									--	--	-.08	-.31
9.	RD PRE (N=26)										.38	.06	-.39
10.	RD POST (N=24)											-.09	-.57
11.	ABSENCE												.18
12.	RATING												

a A correlation of .20 was significant at $p<.05$.

b Ns for the proficiency measures vary according to data available from reading and writing classes. Writing classes did not take reading tests and vice versa. For N=75 $r=.25$, $p<.05$; for N=24, $r=.38$, $p<.05$.

Table 4

Correlations of Weighted Attributions with Other Cognitive Measures

	SRL		SEM		SES	
	Pre	Post	Pre	Post	Pre	Post
Ability Pre						
S	- .01	- .02	.23	- .08	.13	- .13
F	.03	- .06	.20	.14	.21	.03
Ability Post						
S	.19	.19	.25	.09	.26	.10
F	- .04	- .04	.16	.23	.20	.20
Effort Pre						
S	.07	.00	.06	- .03	.18	.13
F	- .26	- .31	- .15	- .14	- .24	- .18
Effort Post						
S	- .10	- .08	.04	.03	.04	.08
F	- .18	- .10	- .11	- .25	- .11	- .22
Strategy Pre						
S	.04	.01	.05	.12	- .03	.06
F	.14	.09	.14	.04	.14	.05
Strategy Post						
S	.02	.04	.09	.01	.01	- .06
F	.12	.08	.22	.09	.13	.03
Tchr/Text Pre						
S	- .03	- .09	- .10	- .04	- .09	- .09
F	- .04	- .07	- .22	- .14	- .13	- .19
Tchr/Text Post						
S	- .11	- .03	- .13	- .08	- .12	- .09
F	.09	.06	- .12	- .07	- .16	- .12
Task Diff Pre						
S	- .09	- .06	.01	- .06	- .08	- .09
F	- .06	.05	.08	- .04	- .08	.00
Task Diff Post						
S	- .04	- .17	- .36	- .08	- .27	- .10
F	- .02	- .17	- .18	- .10	- .17	- .05

Table 5

MEANS AND STANDARD DEVIATIONS OF ALL MEASURES BUT ATTRIBUTIONS BY TREATMENT AND SUBJECT

(N = 124 Students)

Measures	TRAINED (N = 58)		UNTRAINED (N = 66)	
	WRITING (N = 39)	READING (N = 19)	WRITING (N = 45)	READING (N = 21)
SRL PRE	61.44 10.57	67.82 8.14	62.28 11.58	65.13 9.65
SRL POST	60.31 10.69	67.84 9.22	59.31 10.30	65.83 8.38
SEM PRE	16.80 4.88	19.90 3.85	14.77 6.05	18.08 2.73
SEM POST	19.26 3.89	21.29 2.78	19.42 4.18	19.79 3.16
SES PRE	44.28 22.07	63.84 14.86	39.62 18.46	51.76 16.02
SES POST	52.69 18.78	62.79 19.93	49.71 15.25	56.40 16.59
WRIT PRE (N=75)	.49[a] .10		.49 .10	
WRIT POST (N=79)	.58 .13		.57 .12	
RD PRE (N=26)		.60 .17		.62 .07
RD POST (N=24)		.78 .09		.81 .12
ABSENCE	2.90 3.12	2.00 1.80	3.44 3.15	2.29 2.41
RATING	2.33 .77	2.47 .91	2.44 .81	1.60 .75

[a] Figures are percent correct out of 100.

TABLE 6

MEANS AND STANDARD DEVIATIONS OF ALL ATTRIBUTION SCALES BY TREATMENT AND SUBJECT

(N = 124 Students)

	TRAINED (N = 58)		UNTRAINED (N = 66)	
MEASURE	WRITING (N = 39)	READING (N = 19)	WRITING (N = 45)	READING (N = 21)
SUCCESS				
Ability Pre	9.49	7.53	7.38	9.05
	3.32	3.58	3.62	2.78
Post	10.69	11.63	11.56	11.14
	4.75	3.93	4.38	4.39
Effort Pre	2.36	3.47	2.69	3.24
	2.49	2.99	2.55	2.61
Post	3.33	4.16	3.71	4.29
	3.31	3.18	2.85	3.70
Strategy Pre	4.51	4.00	4.89	4.33
	2.87	2.03	2.67	3.06
Post	5.41	3.00	4.49	6.24
	3.14	2.81	3.27	3.65
Tchr/Text Pre	4.41	4.16	4.11	3.38
	2.75	2.87	3.21	1.72
Post	4.54	3.47	3.44	3.10
	3.30	2.64	2.12	1.97
Task Diff Pre	3.31	2.95	3.60	3.62
	2.15	2.20	2.19	2.33
Post	1.72	3.00	2.67	1.76
	2.34	4.62	2.79	2.23
FAILURE				
Ability Pre	6.33	3.53	5.38	5.24
	2.44	3.24	4.05	3.15
Post	8.46	6.37	8.96	8.29
	5.16	3.93	4.16	3.95
Effort Pre	2.05	1.53	1.93	1.76
	2.33	1.42	2.03	1.48
Post	2.87	4.37	2.91	3.19
	2.26	3.75	2.49	2.75
Strategy Pre	5.26	5.11	5.38	5.38
	3.07	2.31	2.82	2.80
Post	7.80	4.10	5.42	7.47
	4.35	3.30	3.35	3.44
Tchr/Text Pre	2.46	4.53	3.09	3.76
	1.85	3.17	1.95	1.14
Post	2.77	4.11	3.87	3.00
	3.13	3.62	3.40	3.66
Task Diff Pre	7.39	5.53	7.20	7.71
	2.74	2.88	3.79	2.92
Post	3.44	4.16	4.18	3.33
	2.79	4.98	3.58	2.60

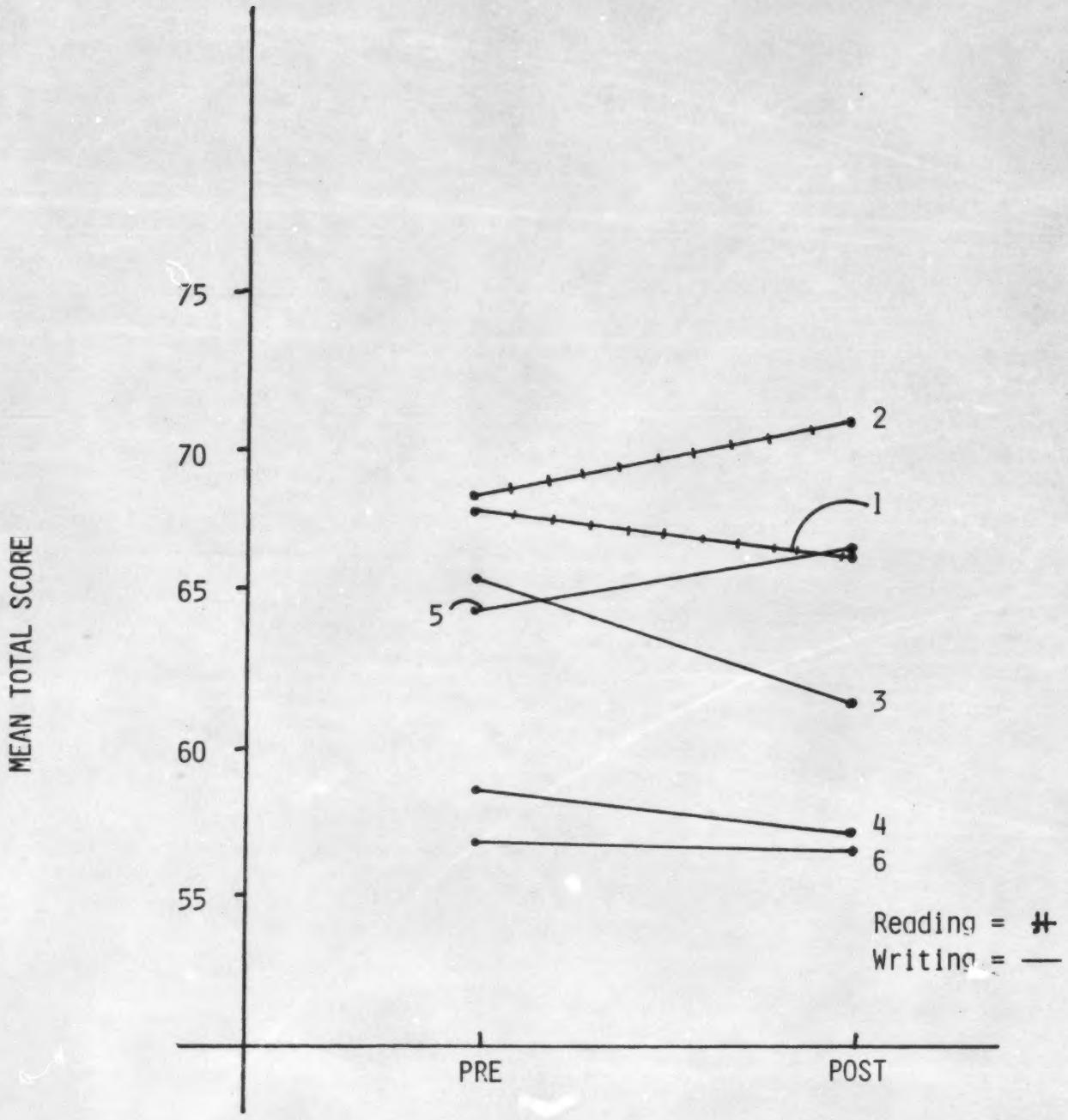

Figure 1. Pre-post changes by class and subject area on self-regulated learning-<u>treatment</u> group.

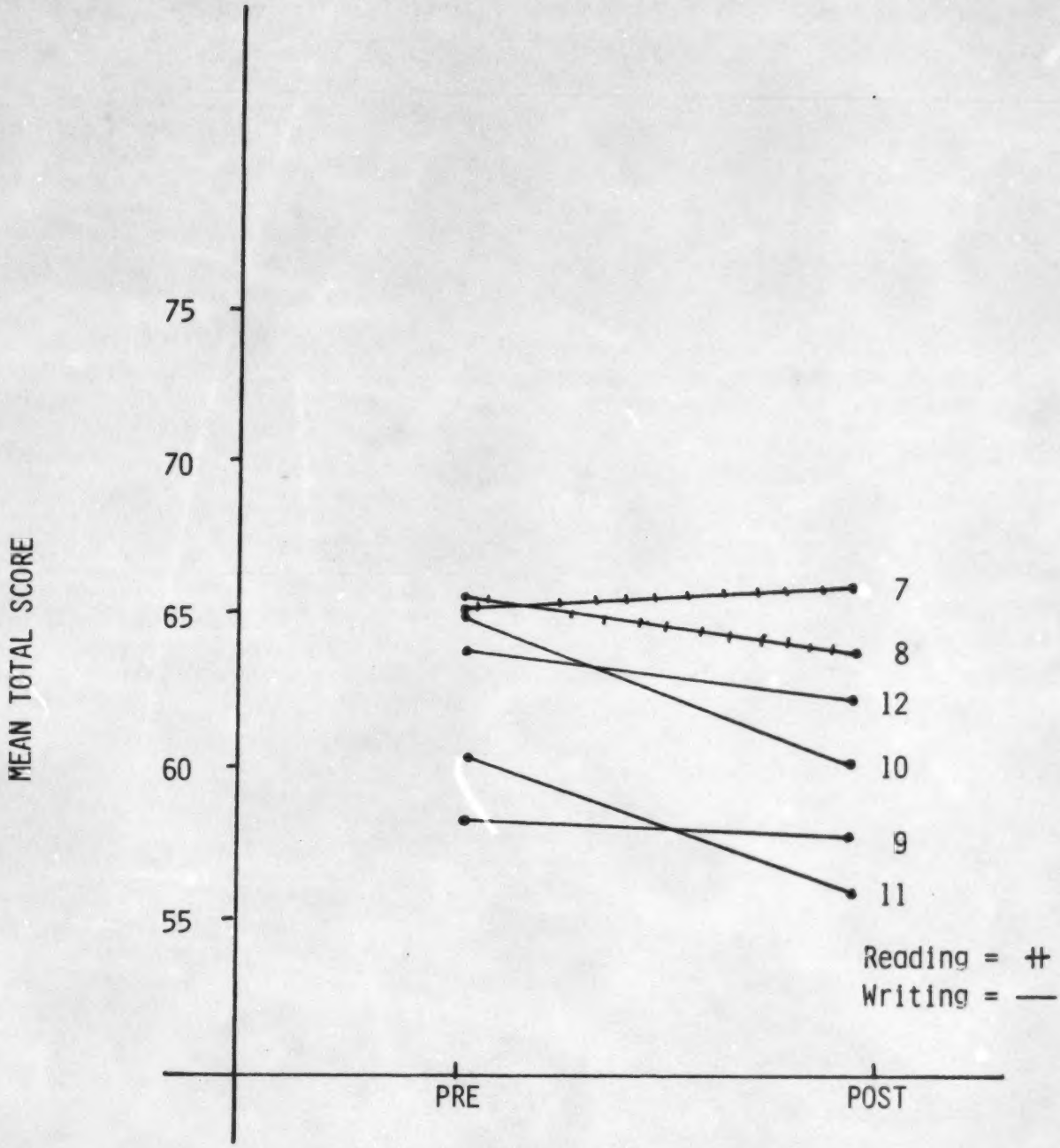

Figure 2. Pre-post changes by class and subject area on self-regulated learning-control group.

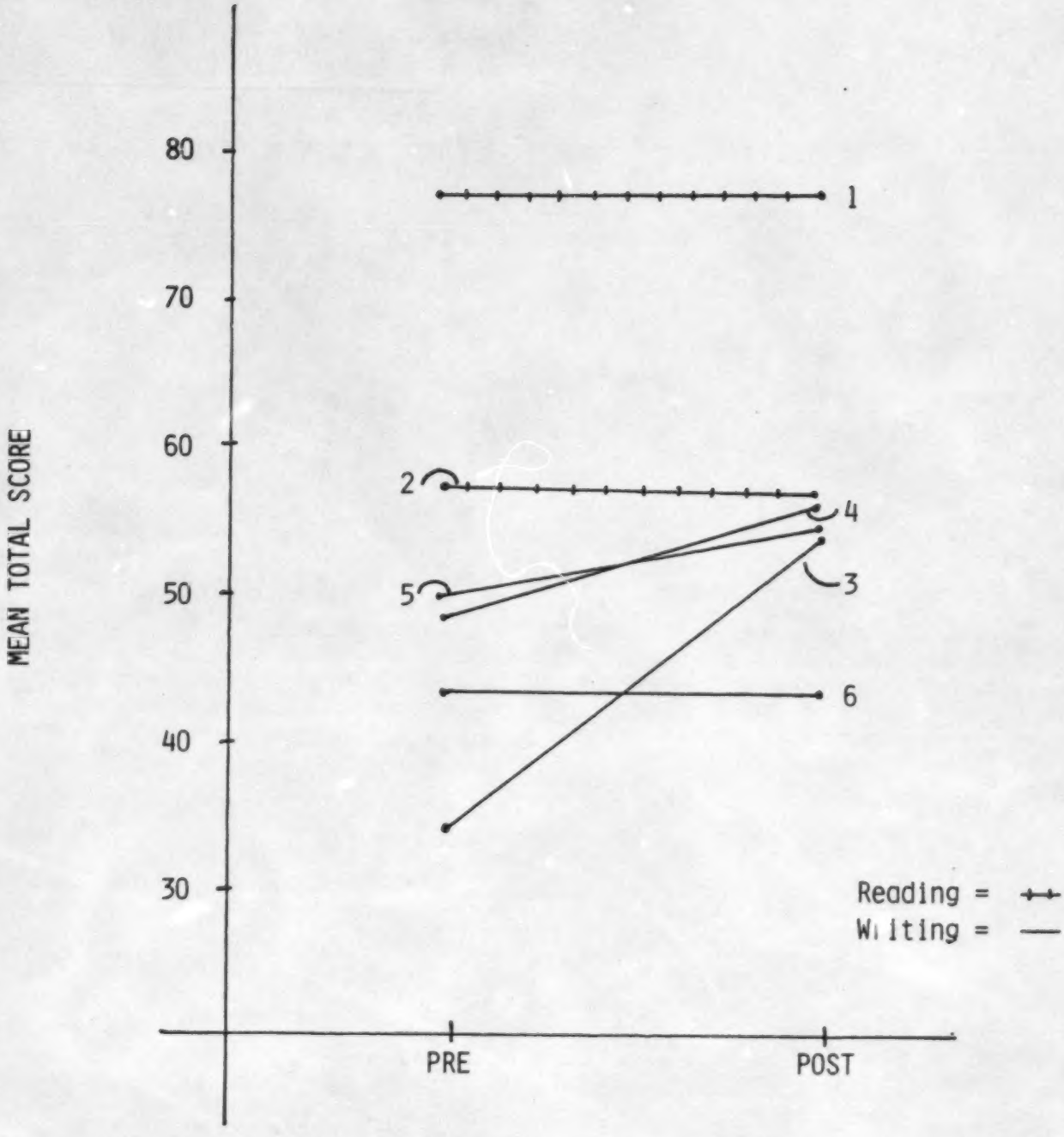

Figure 3. Pre-post changes by class and subject area on strength of self-efficacy-<u>treatment</u> group.

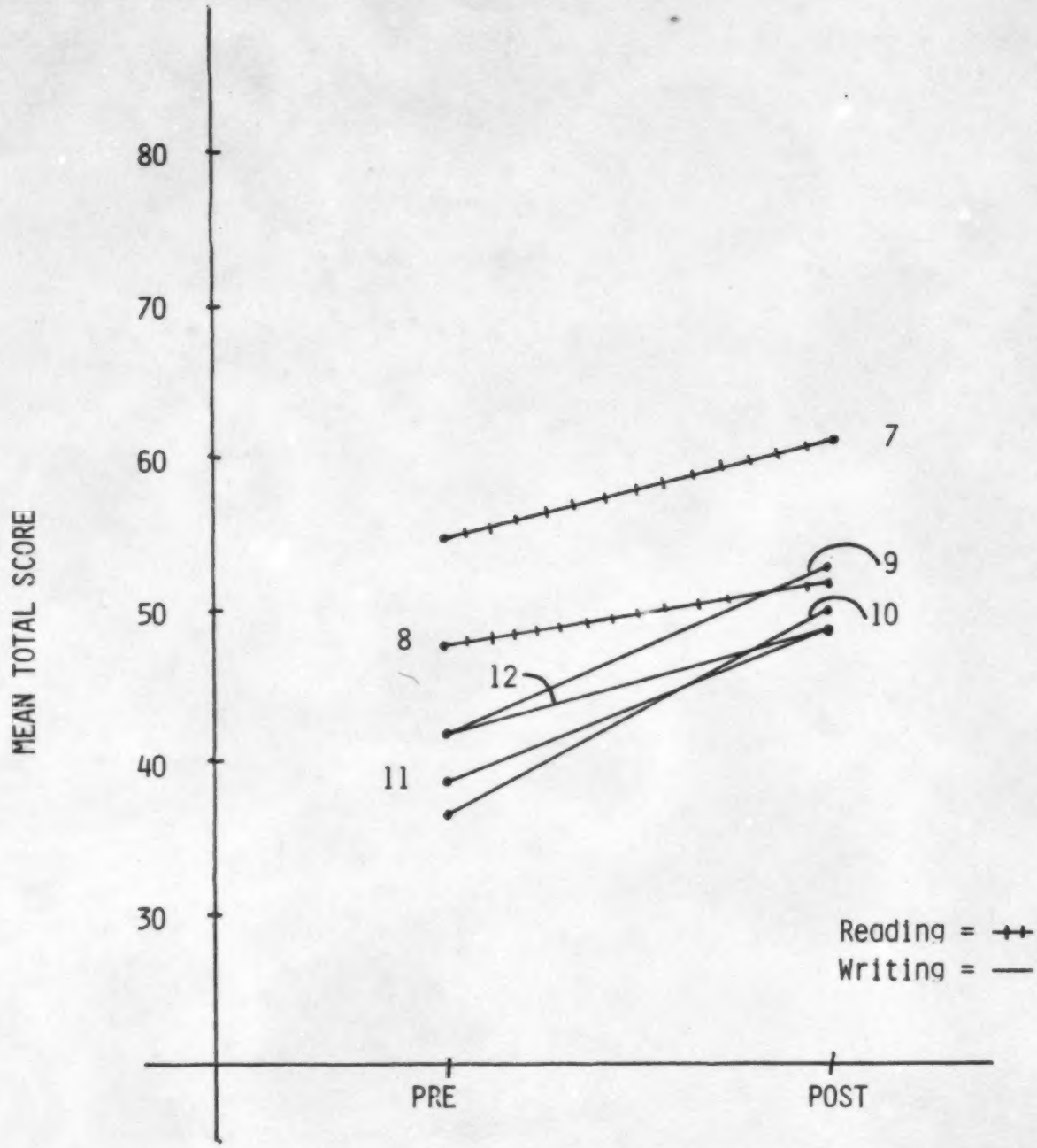

Figure 4. Pre-post changes by class and subject area on strength of self-efficacy-control group.

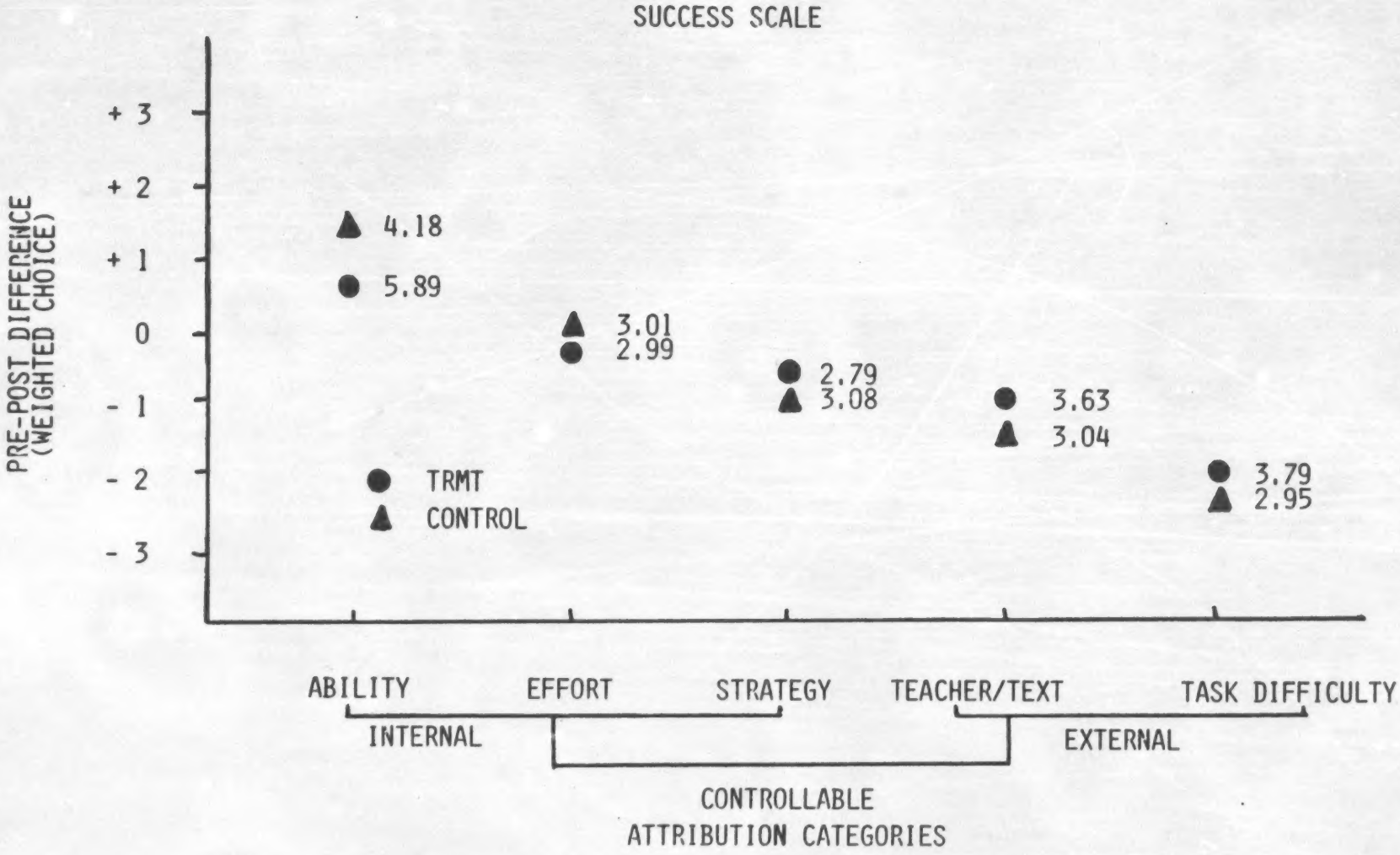

FIGURE 5. WEIGHTED CHOICE DIFFERENCE SCORE MEANS AND SDS BY TREATMENT GROUPS ACROSS ATTRIBUTION CATEGORIES

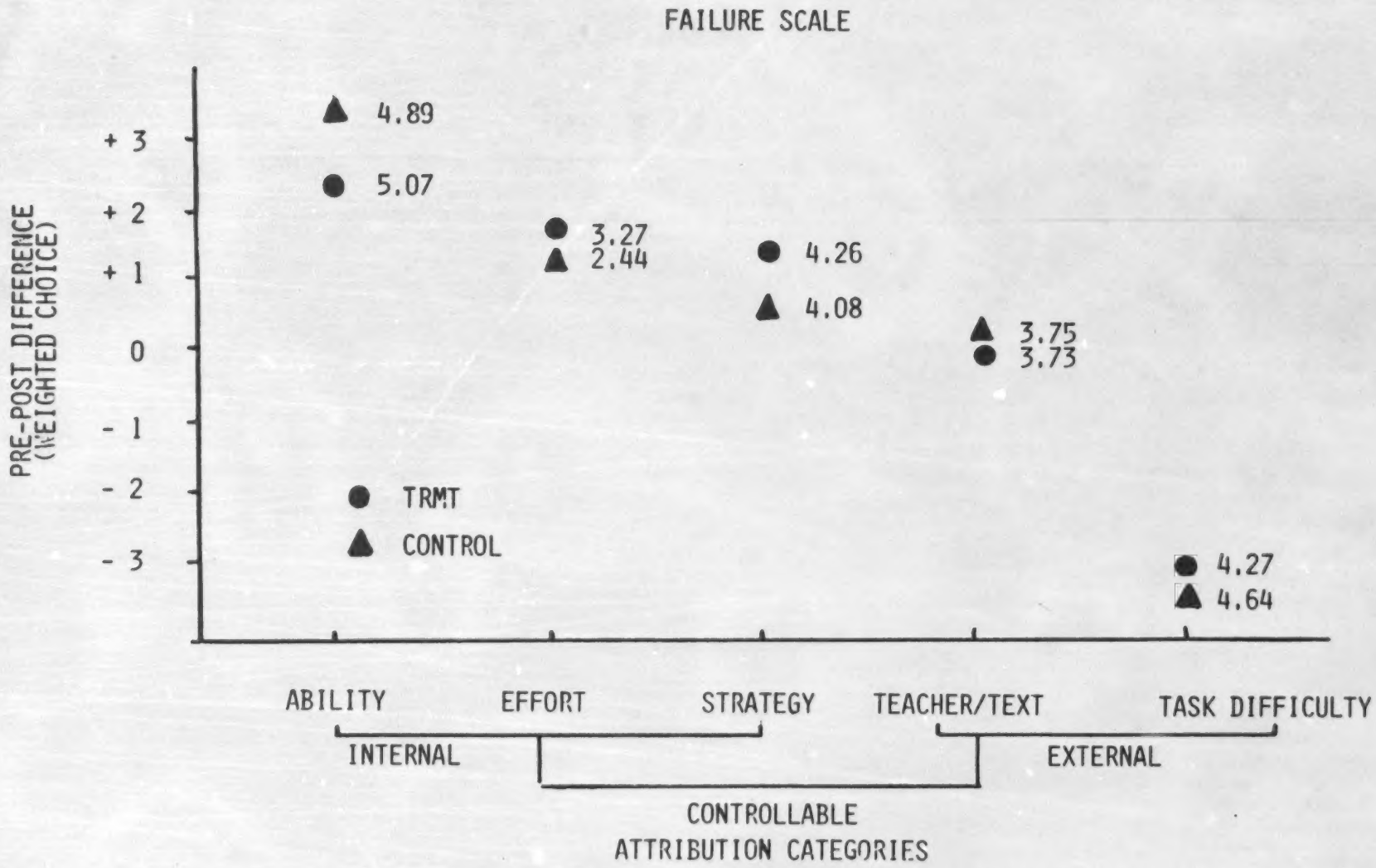

Figure 6. WEIGHTED CHOICE DIFFERENCE SCORE MEANS AND SDS BY TREATMENT GROUPS ACROSS ATTRIBUTION CATEGORIES

Footnotes

1 Special thanks to Ellen Mandinach, who conducted the computer analyses for this study and assisted in the teacher training. The study was supported by the California State Department of Education, Office of Program Evaluation and Research, but contents of this paper do not necessarily reflect views of that office.

2 Self-regulated learning is distinguished from Bandura's self-regulated behavior by the direct emphasis on information acquisition and restructuring.